



1301 Fifth Avenue
Suite 3800
Seattle, WA 98101-2605
USA

Tel +1 206 624 7940

milliman.com

July 30, 2020

Teachers' Retirement Board
CalSTRS
P. O. Box 15275
Sacramento, CA 95851-0275

Re: Projection of SBMA Funding Sufficiency

Dear Members of the Board:

The purpose of this letter is to analyze whether the Supplemental Benefit Maintenance Account (SBMA) is projected to have sufficient funds, along with expected future contributions, to pay purchasing power benefits in the future. At the current 85% purchasing power level, the current SBMA assets plus expected future contributions are projected to be sufficient to pay all expected benefits through June 30, 2089. Based on the relevant sections of the Education Code and the SBMA regulations, the calculated purchasing power level remains at 85% for payments in the fiscal year beginning July 1, 2020.

Background

Sections 22954, 22954.1, 24415, 24415.5 and 24416 of the Education Code apply to the SBMA and purchasing power benefits:

- **Purchasing Power Level** – The benefits paid from the SBMA maintain the purchasing power of current benefits to at least 80% of the member's original benefit. Currently the purchasing power level is set at 85%.
- **Flexible Purchasing Power Level** – The Board has the authority to adjust the percentage of purchasing power protection maintained by the SBMA within a range of 80% to 85%. This adjustment is based on an actuarial projection adopted by the Board that evaluates the sufficiency of resources available to pay the benefit over a period of time established by the Board. Board regulations regarding the actuarial projection of the SBMA include a period of sufficiency through 2089.
- **State Contributions** – The annual state appropriation to the SBMA is 2.5% of payroll in the fiscal year preceding the prior calendar year, reduced by \$72,000,000.

Results

Based on the assumptions used in this analysis, sufficient funds are projected to cover SBMA benefits at the 85% level through the fiscal year ending in 2089. Based on these projections and the relevant sections of the Education Code and the SBMA regulations, the calculated purchasing power level remains at 85% for payments in the fiscal year beginning July 1, 2020.

The projected SBMA funding provides some margin over the expected purchasing power benefits at the 85% level. This margin is approximately equivalent to an additional 7% purchasing power benefit. In other

This work product was prepared solely for CalSTRS for the purposes described herein and may not be appropriate to use for other purposes. Milliman does not intend to benefit and assumes no duty or liability to other parties who receive this work. Milliman recommends that third parties be aided by their own actuary or other qualified professional when reviewing the Milliman work product.

words, the current SBMA balance plus expected future contributions would be projected to be sufficient to pay purchasing power benefits at a 92% level through the fiscal year ending in 2089 based on the assumptions used in this analysis.

Sensitivity to Future Experience

The assumptions which most significantly impact the SBMA are the mortality assumption, the assumed future rate of inflation of 2.75%, the annual investment return of 7.00%, and future annual increases in payroll of 3.50%. These assumptions are consistent with the Defined Benefit (DB) Program, except for the minor adjustment to the mortality assumption discussed in the “Assumptions” section of this letter. If any of these assumptions are changed, it could materially affect our findings.

As an example, whether the actual inflation is greater than or less than assumed is a significant factor on this projection. Under the SBMA program, a rate of inflation that is higher than the 2.75% assumption will result in purchasing power allowances that exceed our projections. On the other hand, a lower-than-expected rate of inflation will result in lower purchasing power allowances. For example, if inflation is 2.75% each year in the future (as currently assumed), the balance in the SBMA is not projected to be depleted. If inflation is 3.75% each year in the future and the purchasing power level remained at 85%, the balance in the SBMA is projected to be depleted in about 35 years. In accordance with the board’s purchasing power policy, if the date of depletion is determined to occur prior to 2089, a reduction in the purchasing power level would be recommended to extend the period of sufficiency until 2089, albeit at a lower benefit level.

We used a stochastic model to assess the likelihood of the SBMA paying all benefits at the 85% purchasing power level through 2089. Based on this analysis, there was estimated to be a 32% probability of the funding being insufficient. This does not factor in the ability of the board to lower the purchasing power level to as low as 80%. Therefore, the probability of insufficiency at the minimum 80% purchasing power level would be less than 32%.

This analysis represents a snapshot of the SBMA Program as of June 30, 2019. Significant volatility in investment markets have occurred in the first half of the 2020 calendar year. Although less-than-assumed returns adversely impact the DB Program funding, the effect on the SBMA Program is less certain. Three of the key factors which could potentially impact future SBMA Program funding are as follows:

- **Inflation** – As previously discussed, low price inflation tends to have a positive impact on the SBMA Program’s funded position. Short-term forecasts project inflation materially lower than the 2.75% assumption. Longer term forecasts are less certain, but we would note that two key long-term forecasts have declined. The inflation assumption used by the Social Security actuary was recently reduced from 2.6% to 2.4%, and the implied inflation for 30-year Treasury Inflation-Protected Securities has decreased from 1.7% at June 30, 2019 to 1.6% as of June 2020.
- **Investment Return** – CalSTRS actual investment return has no direct impact on the SBMA funding, as the SBMA Program is credited with interest based on the DB Program return assumption. If the DB Program return assumption remains at 7.0%, there will be no impact on the SBMA Program funding. It is possible that lower forecasts of inflation (which is an implicit component of the DB Program return

assumption) and a poor global economic outlook could result in the board adopting a lower return assumption for the DB Program in the next few years, which would have a negative impact on the projected SBMA Program funding. However, if the return assumption is lowered, it seems likely that the inflation assumption would also be lowered, which would be expected to more than offset the impact of a lower return assumption.

- **Payroll** – Based on the current assumptions, the annual contributions being received have a greater value than the purchasing power benefits being earned each year. Therefore, if the payroll is less than projected, this would have a negative impact on the SBMA Program funding.

As inflation tends to have the most significant impact on the SBMA Program, and it is projected to be lower than assumed, we do not expect the current economic environment will adversely affect the program's funding.

Comparison of Current Resources and Liabilities

Currently the SBMA has a projected funded surplus of \$11.2 billion for current DB Program members as of June 30, 2019. That is, the value of the current resources (current assets plus projected future contributions on current member payroll) of \$26.7 billion exceeds the projected value of future purchasing power benefits for current members of \$15.5 billion. As with the projection of sufficiency, this estimate is based on the current actuarial assumptions and an 85% purchasing power level, except that this estimate does not reflect future DB Program members. Future results will be sensitive to future experience, in particular future inflation experience.

Additional Analysis

The results are consistent with the previous study in that the current funding level is projected to be sufficient to maintain an 85% purchasing power level. The margin decreased from 8% in the prior analysis to 7% this year; that is, the prior study showed the program was projected to be sufficient at a 93% purchasing power level which declined to 92% this year. Thus, the SBMA is now slightly less well funded than in the previous projection. The two differences that caused a decrease in the probability of sufficiency reflected in this year's study as compared to the study completed in 2018 were:

1. Inflation for the last two years exceeded the assumption. This increased the value of purchasing power benefits currently being paid to retirees. This also shortened the projected period until receipt for retirees not currently receiving purchasing power benefits.
2. A technical modification was made to the expected timing of future retirements to better reflect actual retirement patterns. This change caused the first year that purchasing power payments are projected to be payable to future retirees to be approximately one year earlier than the prior method. Additional details are included under Retirement Timing in the Assumptions and Methods section of this letter.

Risk Discussion

The results of any actuarial valuation or study is based on a set of assumptions. Although we believe the current assumptions provide a reasonable estimate of future expectations, it is almost certain that future experience will differ from the assumptions to some extent. The following is a general discussion of the

potential risks to the SBMA Funding Sufficiency and is not intended to be a comprehensive analysis of all potential risks.

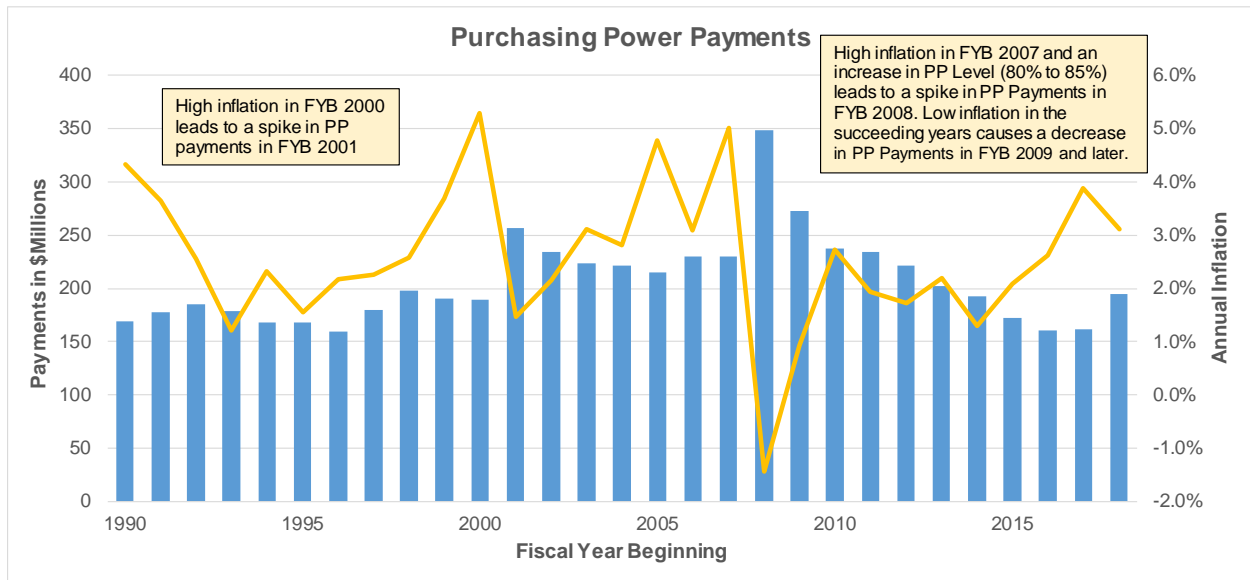
There are a number of factors that can affect the projection results. To the extent actual experience for these factors varies from the assumptions, this will likely cause either increases or decreases in the plan's future funding level. Examples of factors that can have a significant impact on the projection results are:

- Inflation
- Demographic experience (primarily mortality, but also termination, disability, retirement from employment, etc.)
- Investment return assumption for the DB Program
- DB Program payroll
- Age at retirement

Variations in inflation, followed by rates of mortality and changes in the investment return assumption, are most likely to have the greatest impact on the ultimate level of funding sufficiency.

We have provided a simplified analysis showing the sensitivity to potentially higher inflation in the Sensitivity to Assumptions section. This analysis shows that with an inflation assumption of 3.75% each year in the future and the purchasing power level remaining at 85%, the balance in the SBMA is projected to be depleted in about 35 years.

One way to assess future risks is to look at historical measurements. The following graph shows the historical purchasing power payments and how they can vary from year to year, particularly due to inflation.



Risks specific to the DB Program are discussed in Milliman’s 2019 DB Program valuation report and the “Review of Funding Level and Risks” produced each fall by CalSTRS actuarial staff. If CalSTRS wants additional analysis on these risks, Milliman can provide a more detailed analysis.

This work product was prepared solely for CalSTRS for the purposes described herein and may not be appropriate to use for other purposes. Milliman does not intend to benefit and assumes no duty or liability to other parties who receive this work. Milliman recommends that third parties be aided by their own actuary or other qualified professional when reviewing the Milliman work product.

Assumptions and Methods

Please note that certain simplified modeling techniques and assumptions were used to produce the results of this analysis, which include estimating purchasing power benefits for current and future retirees and beneficiaries, including for people who are expected to become members of CalSTRS in the future and then retire and ultimately receive a purchasing power benefit. We believe these techniques are reasonable for purposes of this analysis (i.e., determining the sufficiency of the purchasing power between 80% and 85% levels) but may need to be modified if the purpose of the analysis is expanded beyond these levels.

The actuarial assumptions and methods have been updated since the last analysis and were adopted by the Teachers' Retirement Board in January 2020. They are the same as those used in the June 30, 2019 DB Program valuation, except for the following modifications:

- **Participant Data** – Actual purchasing power benefits for existing retirees and beneficiaries was not provided, so they were estimated based on historical CPI information provided by CalSTRS.
- **Historical Benefit Increases** – In the calculation of an individual's purchasing power benefit, the only previous post-retirement increases (outside of purchasing power benefits) are assumed to have been the 2% annual benefit adjustments. Certain retiree benefit increases that occurred in 2000 and 2001, such as the minimum guaranteed benefit and the ad-hoc COLA under AB 429, are treated as separate benefits with an effective date of the date of the increase. For current and future retirees, only the 2% annual benefit adjustment is assumed to occur in the future.
- **New Entrants** – The projection of future purchasing power benefits includes anticipated new active members replacing those active members who are expected to leave active employment each year.
- **Equilibrium** – After 50 years, the population receiving purchasing power benefits is assumed to reach an equilibrium; that is, expected deaths from the group are replaced by the same number of new retirees eligible for the benefit. This is reflected in the projection with an increase in the purchasing power benefits paid of 3.50% each year starting in 50 years. This increase is equivalent to the assumed annual increase in payroll and therefore the annual increase in the average DB Program benefit.
- **Mortality Improvement** – After 50 years, the mortality of the retired population is assumed to improve over current levels; that is, retirees and beneficiaries are assumed to live longer. This is reflected in an annual increase in purchasing power benefits of 0.25%, in addition to the 3.50% increase described above. Note that prior to 50 years, a projection scale is included with the base mortality assumptions to reflect expected future mortality improvement.
- **Form of Payment Adjustment** – In the DB Program valuation, all members who have not yet retired are assumed to receive their benefit in the unmodified (member's life only) form upon retirement. Since optional forms are assumed to be reduced on an actuarial equivalent basis, this assumption does not have a material impact on the DB Program valuation. However, this is not true for the actuarial projection of the SBMA. The value of a purchasing power benefit with a survivor continuance and an actuarial reduction made on the basis of the DB Program is usually greater than the value of a purchasing power benefit under the unmodified form. We have increased the projected purchasing power benefits for future retirements by 19.3% to account for the increased value of optional forms of

payment. Similar to the DB Program, we have used the actual form of payment elected for current retirees and beneficiaries.

- **Retirement Timing** – Retirement from active status is assumed to occur at the middle of the year in the DB Program valuation. For purposes of calculating eligibility for the purchasing power benefit, retirement is assumed to occur on July 1 of the applicable year. There are three possible periods that affect the purchasing power calculation differently. The July 1 retirement assumption approximates actual experience and is the middle-cost option of the three, which is why we selected it. The three periods using July 1, 2019 to June 30, 2020 retirement dates are shown as an example. The percentage of the total service retirements based on current retirees is also shown.
 1. July 1 to August 31, 2019 (23% of retirements) – The first 2% benefit adjustment would be received September of 2020; CPI would be based on the year 2019. Under this approach, the first 85% Purchasing Power payment is projected to be made after 17 years (from the valuation date).
 2. September 1 to December 31, 2019 (8% of retirements) – The first 2% benefit adjustment would be received September of 2021; CPI would be based on the year 2019. Under this approach, the first 85% Purchasing Power payment is projected to be made after 16 years (from the valuation date). If this assumption were used, it would result in the highest estimated cost.
 3. January 1 to June 30, 2020 (69% of retirements) – The first 2% benefit adjustment would be received September of 2021; CPI would be based on the year 2020. Under this approach, the first 85% Purchasing Power payment is projected to be made after 18 years (from the valuation date). If this assumption were used, it would result in the lowest estimated cost.
- **School Lands Revenue** – The projection does not assume any additional revenues from school lands in the future. Currently this makes up less than 1% of the total contributions received by the SBMA. If this were included, it would not materially impact the results of the actuarial projection.
- **Stochastic Model** – The model varies actual inflation in the future, based on a geometric average inflation of 2.75% with an annual standard deviation of 2.0% and an annual reversion to the mean of 25%.

Actuarial Certification

The cost estimates presented in this letter reflect the SBMA benefit provisions in effect as of June 30, 2019 and the actuarial assumptions and methods used in the June 30, 2019 DB Program valuation, except where noted. These projections are subject to the uncertainties of a regular actuarial valuation; the projections are inexact because they are based on assumptions that are themselves necessarily inexact, even though we consider them reasonable. Thus, the emerging costs may vary from those presented in this letter to the extent actual experience differs from that projected by the actuarial assumptions.

In preparing the June 30, 2019 actuarial valuation upon which this letter is based, we relied, without audit, on information (some oral and some in writing) supplied by CalSTRS staff. This information includes, but is not limited to, statutory provisions, employee data, and financial information. We found this information to be reasonably consistent and comparable with information used for other purposes. The valuation

results depend on the integrity of this information. If any of this information is inaccurate or incomplete, our results may be different and our calculations may need to be revised.

All costs, liabilities, rates of interest, and other factors for CalSTRS have been determined on the basis of actuarial assumptions and methods which are individually reasonable (taking into account the experience of CalSTRS and reasonable expectations); and which, in combination, offer a reasonable estimate of anticipated experience affecting CalSTRS. Further, in our opinion, each actuarial assumption used is reasonably related to the experience of the plan and to reasonable expectations which, in combination, represent a reasonable estimate of anticipated experience under CalSTRS.

Future actuarial measurements may differ significantly from the current measurements presented in this letter due to such factors as the following: plan experience differing from that anticipated by the economic or demographic assumptions; changes in economic or demographic assumptions; increases or decreases expected as part of the natural operation of the methodology used for these measurements; and changes in plan provisions or applicable law. Due to the limited scope of our assignment, we did not perform an analysis of the potential range of future measurements. The Teachers' Retirement Board has the final decision regarding the appropriateness of the assumptions and adopted them as indicated in Appendix B of the DB Program valuation report. Modified assumptions specific to this actuarial projection are discussed in the "Assumptions and Methods" section of this letter.

Actuarial computations presented in this letter are for purposes of determining the projected funding sufficiency of the SBMA. The calculations in this letter have been made on a basis consistent with our understanding of CalSTRS' current funding requirements. Determinations for purposes other than meeting these requirements may be significantly different from the results contained in this letter. Accordingly, additional determinations may be needed for other purposes.

Milliman's work is prepared solely for the internal business use of CalSTRS. To the extent that Milliman's work is not subject to disclosure under applicable public records laws, Milliman's work may not be provided to third parties without Milliman's prior written consent. Milliman does not intend to benefit or create a legal duty to any third party recipient of its work product. Milliman's consent to release its work product to any third party may be conditioned on the third party signing a Release, subject to the following exceptions:

- (a) CalSTRS may provide a copy of Milliman's work, in its entirety, to CalSTRS' professional service advisors who are subject to a duty of confidentiality and who agree to not use Milliman's work for any purpose other than to benefit CalSTRS.
- (b) CalSTRS may provide a copy of Milliman's work, in its entirety, to other governmental entities, as required by law.

No third party recipient of Milliman's work product should rely upon Milliman's work product. Such recipients should engage qualified professionals for advice appropriate to their own specific needs.

The consultants who worked on this assignment are retirement actuaries. Milliman's advice is not intended to be a substitute for qualified legal or accounting counsel.

The signing actuaries are independent of the plan sponsor. We are not aware of any relationship that would impair the objectivity of our work.

On the basis of the foregoing, we hereby certify that, to the best of our knowledge and belief, this letter is complete and accurate and has been prepared in accordance with generally recognized and accepted actuarial principles and practices, including the relevant Actuarial Standards of Practice. We are members of the American Academy of Actuaries and meet the Qualification Standards of the American Academy of Actuaries to render the actuarial opinion contained herein.

We respectfully submit this letter and we look forward to discussing it with you.

Sincerely,



Nick J. Collier, ASA, EA, MAAA
Consulting Actuary



Mark C. Olleman, FSA, EA, MAAA
Consulting Actuary



Julie D. Smith, FSA, EA, MAAA
Consulting Actuary

NJC/MCO/JDS/nlo

cc: Jordan Fassler
David Lamoureux
Rick Reed